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PSYCHOLOGICAL ASPECTS OF ADULT DEVELOPMENT, ABSTRACTS OF RESEARCH.

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This set of abstracts has been assembled to provide a brief introduction to the psychological research literature related to adult development. The present focus on psychological aspects includes only a portion of the research literature related to adult development, which in its entirety draws from all of the social and behavioral sciences. Even within psychological research, the present abstracts focus on three aspects of adult development--physiology, personality, and learning. The abstracts are grouped by content and sequenced so that the content of earlier abstracts contributes to a better understanding of subsequent ones. The abstracts were prepared by various persons using somewhat differing formats and emphases. This set is therefore a preliminary collection, prepared for internal use and as a basis for assembling in the future a more carefully selected and prepared set of readings on adult development. Additional copies were run in the belief that in the meantime they might be of value to researchers and scholars who are interested in adult development. (author)

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PSYCHOLOGICAL ASPECTS OF ADULT DEVELOPMENT

Abstracts of Research

Alan B. Knox and Associates

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A. PHYSIOLOGICAL STABILITY AND CHANGE

The abstracts in this section deal primarily with the adult's input of information through vision and hearing, and his output of responses through speech. There are also several abstracts on arteriosclerosis and reaction time. Among the sub-topics that are not represented in the current set of abstracts are the sense of touch, strength, endurance, manual dexterity, pacing, and several aspects of reaction time and response time. In seeking to identify generalizations regarding age changes from research studies related to this section, it is important to give attention to the relative extent of stability and change that is associated with each variable during various segments of the adult life cycle.

1. Lansing, Albert I. (ed.), Cowdry's Problems of Aging. 3rd ed., Baltimore, Williams and Wilkins Co., 1961. 1061 pp.

In an attempt to find approaches to the question, "What do we mean by Aging?", it is important to separate the pathological aspects from the normal aspects of aging. Body fluids, changes in various types of cells and the relation of pathology to aging are discussed by the several contributors. Some emphasize the importance of nutrition. The role of the endocrine function seems important overall, but retains its secrets best. Endocrine changes seem to be interrelated with all bodily changes in age. Eye and ear functions attributed to aging may be largely a function of environmental influences. Further, environmentally influenced data concerning changes in the respiratory system are nearly all that are available. The influence of vascular changes on organs, the digestive system which is little influenced by normal aging, as well as skeletal, teeth, and skin changes, are all discussed. Female sexual activity and reproduction changes are well known, but the same phenomenon in the male eludes definitive description. Modification of anesthesia and surgery for the aged is also described. The adequacy of the understanding of degenerative diseases is limited by knowledge of normal changes; cancer is not a result of aging, but only more common in the aged because of the time usually required for the disease to develop. Reference to special problems in rehabilitating the aged, the older worker in industry, and trends of increasing numbers of older persons are included. The book concludes by relating the aging process to personal adjustment of the aging individual. This volume is the most important single source concerning physical aging and problems of the aged.

2. Guth, S.K., Eastman, A.A., and McNelis, J.F., "Lighting Requirements for Older Workers," Illuminating Engineering, 1956, Vol. 51, pp. 656-660.

The purpose was to study the relation between age and the effect of increasing intensity of illumination on visability. One hundred per-

sons ranging in age from 17 to 65 years were tested on their ability to read 6-point type through the Luckiesh-Moss Visability Meter. All of them had been refracted beforehand to eliminate effects of refraction differences, and all subjects were permitted to become acquainted with the words to be used in order to eliminate learning.

The older persons required higher intensities of light to obtain the same degree of visability as younger subjects. Increasing the intensity of light produced a greater relative improvement for the older persons. The older persons required a greater absolute increase in intensity of light than the young to achieve an equal improvement in visability level.

3. Slataper, F. J., "Age Norms of Refraction and Vision," Archives of Ophthamology, 1950, Vol. 43, pp. 466-481.

The purpose was to study the relationship between age and visual acuity. The sample included persons between the ages of 1 and 90. The measurements were obtained with a metric chart at 5 meters on a 1-minute angle, using standard illumination of 10 foot-candles.

Average visual acuity is 5/35 at 1 year of age, 5/12.1 at 2 years, and 5/5 at 12 years. It reaches the maximum of 5/4.4 at the age of 18 and remains stationary until age 62, when it drops to 5/5.2. At the age of 70 it drops suddenly because of the senile changes in the eye. After age 80, practically all eyes show nuclear changes with the slit lamp even though the lenses are apparently clear.

4. Birren, J.E., Casperson, R. C., and Botwinick, J., "Age Changes in Pupil Size," Journal of Gerontology, 1950, Vol. 5, pp. 216-221.

The purpose was to study the relationship between age and the size of the pupil of the eye under conditions of darkness and 1.0 millilambert of illumination.

Pupil size was measured for 222 persons ranging in age from 20 to 89 years, findings based on cross-sectional data.

The mean pupillary diameter under both light and dark conditions declined with age from an average of 7½ millimeters in the dark and 5 millimeters in the light at age 20, to an average of almost 5 millimeters in the dark and about 3½ millimeters in the light at age 89. The correlation between pupil size and age was found to be curvilinear with the decline between age 20 and age 60 more rapid. The correlation ratio between pupil size and age was .61 in light and .70 in darkness. A significant correlation of .83 was found between pupil size in the light and dark, with age held constant. The ratio of the difference in pupil area in the dark and in the light to the size in the dark was about 0.53 and differed only 0.02 between the young and the aged groups, indicating that the older pupil constricted as much as the younger in relation to its initial size.

5. Birren, J.E., Bick, M.W., and Fox, Charlotte, "Age Changes in the Light Threshold of the Dark Adapted Eye," Journal of Gerontology, 1948, Vol. 3, pp. 267-271.

The purpose was to study the extent to which the minimum dark-adapted light threshold changed as a function of age. The cross-sectional sample extended between 10 and 80 years.

There appears to be a slight drop in log threshold up to the 20's (to about 2.60) and then a gradually accelerating rise in log threshold to about 3.00 around age 60. The increase then becomes more marked, rising to 3.80 around age 70. Because the experiment controlled for pupillary changes with age, the changes can not be attributed to the decrease in pupil size with age. In the dark adapted eye, the light must be brighter for the older person to see it.

6. Morgan, M.W., "Changes in Refraction Over a Period of Twenty Years in a Non-Visually Selected Sample," American Journal of Optometry, 1958, Vol. 35, pp. 281-299.

The purpose was to study longitudinal age changes in Hyperopia (far-sightedness), Myopia (near-sightedness) and Astigmatism. A small sample of men and women were tested periodically between the ages of 13 and 33.

Hyperopes tended to become more hyperopic, and myopes more myopic. Females were found to be relatively more myopic than males at age 13, and this tendency increased to age 33. The larger numerical change in myopic than in hyperopia gave a mean myopic change, which is the usual finding. There was an increased Astigmatism in the vertical meridian in females; similar change in lens curvature in males did not lead to increased Astigmatism.

7. Lansing, Albert, "The Ear and Aging," Cowdry's Problems of Aging, 3rd edition, Baltimore, Williams and Wilkins Col, 1952, (1961), pp. 260-276.

In this attempt to give an overall discussion of the ear and aging, it was noted that any attempt to evaluate the impairment of hearing must concern itself with the elderly individual's occupational, psychological and social adjustment as well as the inability to hear certain frequencies. New histochemical methods of studying the inner ear may result in a more objective evaluation of the histological changes in the inner ear with old age. Surveys were cited which showed that hearing loss increased with age and frequency. The hearing loss most associated with deafness after 45 was known as a perceptive, nerve or high-tone deafness. Central deterioration and a slowing of central processes during old age may result in deceleration of cortical interpretation for speech and sounds concurrent with difficulty following rapid speech. Psychogenic deafness may complicate an already existing hearing loss. The author goes on to postulate that such factors as pitch distortion, lack of patience of the older individual and a lack of concentration

ability may subvert the value of hearing aids for the older person. An understanding of physiological changes of aging and its relationship to the anatomical regions of the ear has been limited in the past. Changes in some regions, such as changes in the temporal bone, may occur, but these may be an extension of processes initiated much earlier in life. More understanding of endogeneous and exogeneous factors from prenatal through middle life is necessary before perceptive deafness for high tones can be entirely attributed to the aging process. Acoustic trauma and its correlation with aging was still in need of much study at the time this chapter was written.

8. Lederer, Francis L., "Hearing Loss From the Womb to the Tomb," Archives of Otolaryngology, Vol. 74, pp. 391-398, 1961.

This article is a general discussion covering three different areas of the population: (1) hearing defects of the very young, (2) hearing defects of the young and middle-aged adult, and (3) hearing defects of the very old. It is the author's intention to alert the physician, and other personnel working with the aging, to the need for their recognition of the total problem of a hearing loss, from the womb to the tomb.

Social, economic, educational, psychological, vocational and medico-legal implications point out the urgent need for more comprehensive knowledge and care for persons suffering from hearing disability. Hearing loss, which is a generic term implying a deviation from the normal, is found in 8 per 1000 persons under 25, 130 per 1000 from 65 to 74 and twice that figure in ages 75 and over.

Hearing loss can start from the womb (teratogenesis) and may be endogeneous or exogeneous. The resulting loss may be conductive, sensori-neural, sensori-neural and conductive, or central. Early detection is essential at this stage since it will result in proper guidance and counsel. The cooperation of educational, psychological, medical, and speech and hearing personnel is important in aiding the child. The author cautions that "the children of today are the adults of tomorrow."

Hearing loss in the active, productive adult is different from the child because it has been superimposed upon mature habits of communication. The loss represents a crisis of adjustment and the patient, not the loss, should be the objective of treatment. Hearing loss to this age group presents a task of internal reorganization. The person's capacities, interests, social position, aspirations and psychological state could be affected. Withdrawal from the environment can only be overcome, according to the author, by ego recovery. The longer the "shock state," the more difficult rehabilitation will be. The team approach is again stressed in the overall management of the hearing loss and will, it is hoped, enable the development of the total person to his maximum effectiveness. Preventative practice (i.e., avoidance of ear infections, control of noise exposure and trauma) is still the better treatment and research and consideration of this area is strongly emphasized. Advances in sur-

gery, such as middle ear surgery for otosclerosis, has reduced the number of persons requiring the assistance of acoustic amplification. Advances in acoustic amplification have also been significant for this population.

The older person who is frequently retired or semi-retired is considered, especially with the older person comprising an even greater proportion of our population. Services must be made available to this population, especially audiology, speech pathology and otology. The selection of a hearing aid must have realistic goals. In fact, "rational application and intellectual honesty should be the basis of philosophic, medical, and surgical measures, especially when faced with an irreversible sensory-neural hearing impairment.

9. Olsen and Inger, "Discrimination of Auditory Information as Related to Age," Journal of Gerontology, 1965, Vol. 20, pp. 394-397.

The purpose was to relate the discrimination of auditory information to age and to consider the variables of perception, concentration, and flexibility.

Two groups of subjects were studied. Group 1, consisted of 50 young adults from 17-26 years of age. Group 2, was composed of older adults from 60 to 95 years of age. To control the variable of intelligence, the WAIS verbal abstract meanings section was used. Audiometric attenuation was set at 59 dB - a regular conversational level. However, the subjects were permitted to adjust the volume if they so wished. Recordings of male and female voices were used and an interference voice was interjected into the message voice. The subjects were trained to know the voice which would deliver the message. The groups were then asked to listen to the message voice with the interference voice and determine which was the interference voice and which was the information voice. Finally, they were requested to repeat the information that they heard.

As a whole no sex variance played a part in discrimination ability. The older adults had more difficulty determining which was the message voice and which was the interference voice. Also older adults were less able to report on the information they had received.

10. Hinchcliffe, R., "Threshold of Hearing for Random Noise," Journal of Speech and Hearing Research, 1961, Vol. 441, pp. 3-9.

The purpose was to determine the reliability and validity of random noise, on threshold measurements and to obtain data on this distribution.

A random sample population of 400 persons stratified for age and sex was used. Age ranged from 18 - 74 years with equal number of males and females in each group. Age groups were set up. An audiometer for speech with a noise generating device was used. Otological examinations were given to all subject as well as air and bone conduction audiometric

tests for octave frequencies from 125+ to 8000 Hz. Random noise was also given with the tests and to ensure reliability, tests were readministered from one to five weeks later.

For the oldest adults, the effects of aging are apparent. The thresholds of hearing for random noise shows the highest correlations with the pure tone of 1000 Hz with decreasing correlation for frequencies above and below this tone. There is a deterioration of the random noise threshold with age. The maximum deterioation occurs at 1000 Hz and the 2 adjacent octaves.

11. Corso, John, "Age and Sex Differences in Pure Tone Thresholds," Journal of the Acoustical Society of America, 1958, Vol. 31, No. 4, pp. 498-507.

The purpose was to provide normative data for presbycusis with a age stratified sample of otologically normal males and females.

The population consisted of 500 subjects who were divided into four age groups - 18-24 years, 34-40 years, and 43-49 years and each group was subdivided into male and female groups. All subjects were otologically intact as determined by an otological evaluation 48 hours prior to audiometric testing. Questionnaires were filled out by all subjects indicating life history which included exposure to noise and ear infections, operations or diseases. Those who indicated any of the above were excluded from the study. All subjects were examined by the Beltone audiometer with the method of 2 dB changes in intensity when the signal was near threshold.

Female subjects below 35 years of age showed excellent agreement in threshold results with a little effect at 500 Hz and 1000 Hz. The males in this age group showed a greater range of effect from 500 Hz to 4000 Hz. The differences for males and females occured most noticeably at 3000 Hz for groups 1, 2, 3 and in group 4 the results were significantly different at 500 Hz. There was less than 5 dB difference for threshold values for right and left ears. The effects of age were most pronounced for the male subject. Below 500 Hz there was less than a 5 dB effect regardless of age or sex but above 75 Hz there was a greater trend for hearing loss to increase with increasing age.

Sex difference was discovered to be independent of age and both men and women showed a decrease in auditory acuity with increasing age and a progressive increase of the loss from the higher to the lower frequencies. Men were effected earlier and indicate a greater degree of auditory impairment.

12. Gloreig, A., Davis, H., "Age, Noise and Hearing Loss," Annals of Otology, Rhinology and Laryngology, 1961, Vol. 70, pp. 556-571.

The purpose was to relate hearing loss to age and hearing loss to noise. The population consisted of 325 professional men who had little noise exposure. The ages ranged from 18 to 79 and samples of men in loud areas of work. All subjects were given air conduction and bone conduction tests with the Beltone audiometer. Air conduction from 250 Hz to 8000 Hz and bone conduction from 250 Hz to 4000 Hz were also given.

From the results obtained, two types of presbyscusis were noted:

1. Conductive loss due possibly to calification and hyalinization at the extreme end of the basalar membrane. At the age of 79, greater threshold shifts at 4000 Hz and small bone conduction shifts and extensive air conduction shifts (this air-bone gap indicates a conductive loss). This is the type of loss that is concerned with normal aging.

2. Sensori-neural - Noise induced hearing loss with age is sensori-neural in nature.

One is not more sensitive to hearing loss caused by exposure to loud noise as one gets older. In middle age there is a high tone air-bone gap indicating a conductive loss and older people had a hearing loss characterized by no recruitment which is also characterized as a conductive loss. Thus the result would be that the nature of hearing loss related to aging is more conductive than neuro-sensory.

13. Ramsdell, D.A., "The Psychology of the Hard of Hearing and Deafened Adult," Hearing and Deafness, Davis, H. and Silverman, R. (eds.), Holt Rhinhart and Winston, New York, 1965, pp. 459-473.

This is an exceptionally good discussion of the changes noted after loss of hearing and the author's hypothesis as to the etiology of these changes. He has seen that individuals, after a loss of hearing, become discouraged, suspicious of family and friends, and depressed. Three psychological levels of hearing were discussed. The interweaving of these three levels or processes provide for the total pattern of living. The three levels include the social level, or ability to comprehend language on a symbolic level, the signal or warning level, which enables us to make adjustments to daily living and the auditory background level which provides the "affective tone" of a background of feeling in daily living. It is this last level which, when affected, results in the inability to couple the patterns of environmental changes in the world around us with the pattern of change in the human body. The overwhelming feeling of "deadness" or depression in the deafened adult may result from the destruction of this sound coupling. Because we react to constantly changing background sounds without being aware of them, we cannot cope with loss of this intangible factor. This would then bring bewilderment and a feeling of inade-

quacy. It is contended that an understanding of the reason for his emotional state would be an important step toward relieving the characteristic depression of the hard-of-hearing adult. Though deafness seems to be a powerful stimulus to any latent paranoid trends in the personality, it is stated that these suspicions must be a part of a life pattern because a person secure in his own emotional life will not develop paranoid trends even when deafened. Practical suggestions for this population include development of an objective attitude as the only sound basis upon which to build readjustment, exploring the use of a hearing aid, anticipating the demands of a social situation as a means of lessening tension, utilizing leisure hours by filling them with creative activity according to the individual pattern of life and submerging the handicap by entering into normal activity centered outside of one's self.

14. Mysak, and Hanley, T.D., "Aging Processes in Speech: Pitch and Duration Characteristics," Journal of Gerontology, 1958 13:309-313.

This article contains a good review of past work on vocal aging. A history of pitch and time factors in males from infancy through young adulthood was presented. Middle-aged and geriatric males were studied to complete the developmental history of pitch and time factors in speech. Central tendencies of pitch reveal a progressive lowering of pitch level from infancy to middle age, thereafter pitch rises with age progression. Pitch variability increases until 18 years of age at which time it levels off, increasing again in men over 80 years of age. With the advancement of age, vocal rate was found to decline. Pitch changes are ascribed to physiological and psychosocial factors. Changes in rate are ascribed to physiological changes.

15. McGlone, Robert E. and Hollien, Harry, "Vocal Pitch Characteristics of Aged Women," Journal of Speech and Hearing Research, 1963, 6:164-170.

This study was done to acquire data concerning the pitch of aged women and compare the results with similar data on females of other ages. Twenty female subjects, ten between 65 and 79 years and ten between 80 and 94 years took part in the study. The phonellographic technique was used to analyze the recording of the Rainbow Passage made by each subject. On comparison of the present data and existing data no significant difference in mean pitch level was found between groups. It was concluded that speaking pitch level of women probably varies little throughout adult life and that women's pitch variability changes little with aging. Among the subjects studied there was no evidence of so-called senile voice.

16. Mysak, Edward, "Pitch and Duration Characteristics of Older Males," Journal of Speech and Hearing Research, 1959, 2:46-54.

The purpose of this study was to obtain normative data concerning pitch and duration characteristics of older males and to test for family relationships in speech between older fathers and their middle aged sons. Subjects were divided into three groups: Group I, 12 individuals 65-79 years old, Group II, 12 men 80-92 years old, and Group III were 15 sons of members of Group II ranging between 32 and 62 years. Each subject recorded the Rainbow Passage and an impromptu speech. A fundamental frequency analyzer was used to analyze pitch and phonation/time ratio. Words per minute were recorded with a stop watch. Fundamental frequency was found to rise with age; oral reading being at a consistently higher level than impromptu speaking. There was a reduction in the phonation/time ratio as a function of age. The number of words per minute decreased with age. No vocal relations were found to exist between fathers and sons.

17. Busse, E., "Psychoneurotic Reactions and Defense Mechanisms in the Aged," Psychopathology of Aging, New York, Grune and Stratton, Inc. 1961, pp. 274-284.

According to Busse, arteriosclerosis may consist of at least two separate entities: (1) defective cholesterol metabolism or circulatory functions, and (2) a breakdown of the structure of elastic elements in the arteries accompanied by calcification. The investigator noted a familial concentration, in cases of arteriosclerosis, coronary artery disease, essential hypertension and cerebral arteriosclerosis and a simple dominant mode of inheritance is considered.

18. Brinley, Joseph F., and Botwinick, Jack, "Preparation Time and Choice in Relation to Age Differences in Response Speed," Journal of Gerontology, 1959, Vol. 14:226-228.

The purpose was to discover factors relevant to the slowing of psycomotor processes with age.

Response times of two groups were measured under conditions which varied in terms of the duration of the interval between a warning light and an auditory signal for response. Fifteen men aged 65-81 years and 15 men 19-32 years were used. Both simple and choice conditions were used.

The response time was significantly greater for the older men in both the simple and choice conditions. A small amount of practice reduced the age differences in both conditions.

B. PERSONALITY, ADJUSTMENT, MOTIVATION, AND SELF-CONCEPT

The abstracts in this section deal primarily with the characteristic ways in which the adult views himself and deals with decisions and interpersonal relations. In addition to studies on consistency and change with age in personality, studies deal with

adult life cycle orientations towards work and productivity, adjustment to later maturity and mental health.

19. Kelly, E. L., "Consistency of the Adult Personality," American Psychologist, 1955, 10:659-681.

The study was begun as a longitudinal exploration of certain aspects of marriage. Kelly administered a battery of psychological tests and a 36-variable personality rating scale to 300 engaged couples; 18 years later, questionnaires were mailed to most of these; 86 percent of the original group responded. Regarding results, on personality variables, there were no significant changes for 20 of the 33 variables. For the 18 variables in which the change was statistically significant, the magnitude of the change was still relatively small, and tended to be in the same direction for both sexes. It was concluded that personality changes occur over the life span, but slowly enough so as not to "threaten the continuity of the self percept or impair one's day-to-day interpersonal relations. It was found that a reliable gain in self-confidence occurs from the twenties to the forties in the case of women, but not so much in the case of men. The findings indicate also, that the changes that occur during adulthood, while not threatening the continuity of the self-percepts, are potentially of sufficient magnitude to offer a basis for those who hope for continued psychological growth.

20. Edwards, A. E. and Wine, D. B., "Personality Changes with Age; Their Dependency on Concomitant Intellectual Decline," Journal of Gerontology, 1963, 18: 182-189.

A report of the results of a study in which adults of all ages (22-76) were compared with respect to the correlation of personality changes and age. The intelligence of the respondent is taken into account in the research. Findings indicate that about 1/2 of the personality variables were significantly correlated with age.

21. Reichard, Suzanne; Linson, Florence and Petersen, Paul G., Aging and Personality, N.Y.: John Wiley and Sons, Inc., 1962.

The purposes of the study were: (1) To examine changes in personality, self concept, and personal adjustment during the period from middle to old age. Particularly, the effects of retirement were to be examined; (2) To investigate the way in which personality influences the adjustment to aging.

An intensive clinical interview and a series of psychological tests of intellectual and motor abilities were administered to 87 subjects. These subjects were all 55 years or over, male, and Caucasian. One half were retired, the others were not.

They had all worked in a non-supervisory capacity in industry or skilled trades. The results of the interviews were correlated with numerous different criterion.

Five patterns of adjustment were found among the subjects. The three well-adjusted groups included: (1) The mature group, which consisted of fourteen persons who took a constructive rather than impulsive or defensive approach to life; (2) The "Rocking-chair" group, which had as its characteristics the need to lean on others and take it easy; and (3) The Armored group, which had a highly developed system of defenses against anxiety.

The poorly adjusted group consisted of: (4) The Angry men, hostile, blaming others for their frustrations and failures, and (5) The Self haters, who turned their anger on themselves.

The findings seem to indicate that successful adjustment in old age appears to depend to a great extent on the whole make-up of his personality and his life-long patterns of adjustment. The individual's personality will determine whether he will grow old successfully, more than situational factors such as health, socio-economic position, or patterns of group membership, although these have a somewhat reciprocal relationship with personality.

22. Brozek, J., "Personality of Young and Middle Age Normal Men: Item Analysis of a Psychosomatic Inventory," Journal of Gerontology, 1952, Vol. 7: pp. 410-418.

A cross sectional study of about 100 college students and 200 professional men, where evidence was found in the direction of increasing self-confidence among men around 50's compared with students in their early 20's. It is interesting to see that the older group was found to have generally poorer emotional adjustment. The other findings included the fact that young adults seem to get most of their pleasure away from the family.

23. Nelson, E., "Persistence of Attitudes of College Students Fourteen Years Later," Psychological Monographs, 1954, Vol. 68, No. 2.

This longitudinal study uses reponses to 60 controversial items toward which the subject might take a conservative or liberal view. The issues were: free trade, science and religion, interracial relations, etc. There was found a persistence of attitudes with a definite impact of regional and institutional factors. It is interesting the increase in liberalism with age and the fact that sex was not a factor in the degree of change.

24. Nelson, E., "Patterns of Religious Attitudes: Shifts from College to Fourteen Years Later," Psychological Monographs, Vol. 70, 1955, 17.

The attitudes toward God (a reality), God (influence on conduct), the Church and Sunday observance are topics of the study. The findings showed a positive trend toward Church after 24 years of life. The change is less favorable to Sunday observance, though. Regional and institutional differences are maintained, but the magnitude of the difference declines.

25. Neugarten, Bernice L. and Guttman, David L., "Age Sex Roles and Personality in Middle Age," Psychological Monographs, 1958 Vol. 72, No. 17.

Neugarten and Guttman used the Thematic Apperception Test to ascertain family role images of those between the ages of forty and seventy. Younger respondents saw the old man as the power in the family but with increasing age he was seen as more passive and submissive. The older woman was viewed as the key figure in the family and for the older respondents, she was viewed as moving from a subordinate position to an authoritarian family role, which reversed the trend of the old man. The authors suggest that with increasing age men become more tolerant of their nurturant and affiliative impulses and women become more tolerant of their aggressive and egocentric impulses. Both sexes show growing constriction in ego qualities and less control of impulses with increasing age.

26. Becker, H.A. and Strauss, A. L., "Careers, Personality, and Adult Socialization," American Journal of Sociology, 1956, 62:253-256.

The purpose is exploration of the socialization process in careers and the effect of this on personaltiy. The authors note the problems of leaving one's work at retirement after being intensely involved in it and the difficulty of providing an adequate replacement while at the same time wanting to be missed for one's personal contribution. The entire article has many thought-provoking ideas and concludes with the statement that, "The crises and turning points of life are not entirely institutionalized but their occurrence and the terms which define and help to solve them are illuminated when seen in the context of career lines."

27. Corey, Lawrence G., "Psychological Adjustment and the Worker Role," Journal of Applied Psychology, 1959, 43:4:253-255.

This is the report of a study which involved 301 subjects, ages 55-65, and was an attempt to clarify whether the personal and social adjustments of nonmanual employees was equally dependent on their roles as workers when compared to the similar adjustments of manual employees. A major conclusion of this survey of 115 nonmanual and 185 manual workers is that, "The worker role, as a source of psychological support for the older employee, is directly associated with the personal adjustment of the manual laborer, while there is little or no association between personal adjustment and the work role of the nonmanual employee." As a result, it is inferred that the "increasing

depersonalization of the industrial setting has fostered irreconcilable conflicts for the manual laborer whose field of self-expression other than his job is neither as diversified nor as psychologically rewarding as that of his occupational counterpart."

28. Ginzberg, Eli and associates, Life Styles of Educated Women, New York, Columbia University Press, 1966, 224 p.

This is a study of 229 women who graduated from professional and graduate schools of a university. The proportion of single women in this sample is 4½ times greater than in the general population. The following aspects in relation to the single woman are discussed: reasons for not having married, choice of career, accommodations to single status, use of leisure time, restrictions of society, acceptance by society, participation in the community, homemaking activities.

29. Newton, Niles, Maternal Emotions, New York: Paul B. Noeber, Incorporated, 1955.

Dr. Newton conducted a research study with controlled, statistical methods based on an idea that the mind and the body are an interacting, inseparable unit.

She interviewed 123 mothers. The first interview took place directly after their first babies were born, and the interviews then continued intermittently for a year. Women were asked about their feelings on menstruation, pregnancy, childbirth, breast-feeding, rooming-in care of the baby, satisfaction in the woman's role in life, and the wish to be a man.

Especially pertinent were chapters four, five, and seven:

Chapter 4 - "Women's Feelings About Pregnancy" (pp. 24-29)

1. Nausea and vomiting were found often in women who didn't desire intercourse or experience orgasm. Also nauseous were those who were highly dependent on their mothers, consulting them frequently about the state of pregnancy.
2. Seventy-five percent of the mothers were more anxious during pregnancy than before pregnancy. Most of the anxiety centered around financial difficulties. Only 16 percent were worried about their own ill health or death, of the possible defectiveness of the baby. The highest economic group were the most accepting of pregnancy.

Chapter 5 - "Women's Feelings About Childbirth" (pp. 30-41)

Dr Newton reports that 5 to 8.7 percent of the female admissions to mental hospitals are for postpartum psychosis.

Breast-feeding is definitely linked with attitudes about mothering.

The women who preferred to bottle-feed their babies expressed the feelings that childbirth was quite difficult, and that men had better lives. Those babies who were successfully breast-fed had much better adjustment in kindergarten than those who were bottle-fed, or those who were changed from breast to bottle feedings. The breast-fed children were more secure, curious, and free to explore the environment.

Chapter 7 - "Women's Feelings About Care of Their Babies" (pp. 59-72)

Those women who did not enjoy caring for their babies had negative feelings about the biological aspects of a woman's life. They were generally not as productive nor as efficient as the mothers who enjoyed looking after their babies. Those who enjoyed baby-care also had more positive feelings about their biological roles.

30. Birren, James E., "Aging and Psychological Adjustment," Review of Educational Research, Dec. 1958, XXVIII, 5:475-490.

The purpose of the study was to provide a review of trends in the study of aging and psychological adjustment, rather than to review details of specific studies. The author integrated and organized contemporary studies dealing with adjustment and aging into a series of distinct areas so that the trends of research in the field would become more apparent.

Birren found the major trends in writings on aging to include the following:

1) State of Information: Reviews of the literature, new journals on aging, and conferences on aging were included in this area. Birren points out that the trend toward increased activity in this general area is limited by the fact that a hiatus is developing in the study of aging "since few investigators have been trained in both 'inner' and 'outer' aspects of the organism."
2) Adjustment to what with what: A second area of concern has been the analysis of the new internal and external factors which arise in aging, and to which the aging individual must accomodate himself.
3) Mental and Physical Health: The relationship of good health to satisfactory adjustment in aging has been a topic of interest, but has been too often studied sociologically rather than psychologically. Currently, health is coming to be regarded as an important prerequisite to good adjustment, but not a sufficient condition.
4) Adjustment and Employment.
5) Learning: Studies in this area have not answered the question of the importance of chronological age per se on learning.
6) Mental Abilities: Most research has neglected to combine cognitive tests with personality tests, weakening the significance of the findings.
7) Perception: Controversy exists on whether slower sensory perception in aging results from slowdown of central nervous system or of periphery.

8) Emotionality: The nature of depression in aging has come up for examination, since it is found in the well adjusted older individual, and appears to be different than depression in youth.
9) Theory: A great deal of speculation has been made in this area; however, lack of empirical research casts doubt on the usefulness of these theories.

Inplications:

Pointing out the trends of adjustment research makes it seem that many aspects of aging have been overlooked. Birren points out that there has been the most research in areas concerning "prerequisites" for good aging, such as disease, housing and economics. Areas associated with the developmental aspects of normal aging have been neglected.

31. Cumming, Elaine, and Henry, William E., Growing Old, The Process of Disengagement: New York: Basic Books, Inc., 1961, Chapter VI "Personality Variations with Aging."

The study is a report on a portion of the findings from the Kansas City Study of Adult Life. The chapter on Personality variations with age is an attempt to relate changes in the aging personality to the theory of disengagement.

The TAT responses of aging men and of women were analyzed separately. The men, aged 50 - 70 were classified according to age and to five affect control types of responses: (1) Focused active mastery; (2) Achievement doubt; (3) Adaptive retreat; (4) Fixed Conformity, and (5) Ego deficit.

The women were classified as: (1) Externalized personal mastery; (2) Internalized passive mastery; (3) Externalized domination; (4) Internalized rigidity, and (5) Externalized ego deficit.

Most of the older men fell into the last three categories indicating passive coping devices and inner retreat. The same pattern was found with women. The differences between youngest and oldest groups were all found to be statistically significant. The older subjects tended to respond to inner rather than outer stimuli, to withdraw emotional investment, to give up self assertiveness, and to avoid challenge.

32. Peck, Robert F., "Personality Factors in Adjustment to Aging." Geriatrics, 1960. 15:124-130.

A report on one phase of the Kansas City Study of Adult Life, this study was designed to examine the relationship between adult adjustment and certain psychological characteristics.

A cross-sectional sample of 120 people between the ages of 40 and 65 was interviewed. Inquiries concerned experiences and attitudes relative to family life, work, friendships, social activities,

religious activities and health. In addition, 6 TAT pictures were administered to each subject. Two judges independently rated results on eight characteristics assumed to be related to later life: (1) Cathectic Flexibility; (2) Mental Flexibility; (3) Ego Differentiation; (4) Body Transcendence, (5) Ego Trascendence; (6) Body Satisfactions; (7) Social Integration, and (8) Over-all Adjustment.

Each of the first seven categories were significantly correlated with category 8 - "over-all adjustment." Cathectic adjustment -- the ability to have high emotive feeling in new experiences -- seems most crucial for over all adjustment, bodysatisfaction seems least so. The results confirmed the belief that chronologic age per se has little to do with adjustment, happiness or effective living. Attitudes and way of life more than the age of the subjects, affected these characteristics. There was no tendency for any of the seven variables to change with age. The author found no general aging effects in mental or emotional flexibility.

33. Beckman, R. O., Williams, Carl D., and Fisher, Granville C., "An Index of Adjustment to Life in Later Maturity," Geriatrics, 13:10, 662-667.

The authors intended to explore the questions: (1) Is successful adjustment in old age a function of chronological age, status, vocation, education or of physical or mental health? (2) Are there significant differences in adjustment between groups of older persons in various categories? (3) Would an index or scale of adjustment to age be of practical value?

From earlier research, items of information or opinion that appeared to have high diagnostic value were selected and edited. This way, a two page questionnaire was devised. "It was designed to serve as an indicator rather than as an exhaustive psychologic examination. Weights between 0 and 6 points were assigned to each item, based on the senior author's judgment. One-hundred eighteen subjects, 50 or older, completed the questionnaire. Seventy-four of these were applicants for employment at the Miami office of the State Employment Service. The others were either recipients of an old age pension, or members of a senior club.

The responses indicate that satisfactory adjustment in old age does not correlate with sex, and is negatively correlated with age. Satisfactory adjustment seems also, to be positively correlated with living with one's family, with employment, with assured income, with level of education, and with club and church participation. Poor adjustment correlates with low socioeconomic status. Despite the fact that satisfactory adjustment declines with age, "it can be maintained by a resourceful individual."

34. Hollingshead, A. B., "Factors Associated with the Prevalence of Mental Illness" in Maccoby, E., Readings in Social Psychology, New York, Holt Rinehart and Winston, 1958, pp. 425-436.

The problem was to obtain accurate information about the frequency of mental illness, and to demonstrate how selected social, biological and disease phenomena are interrelated in the prevalence of treated psychiatric disorders in a defined population.

The method consisted of empirical testing of hypothesized relationships between class status and mental illnesses based on (a) the determination of who is a psychiatric "case," selection of a cross-sectional sample of the community's population as a control and (b) the stratification of both the control and psychiatric population.

Of the various conclusions derived, those conclusions that were pertinent to the topic of mental illness and aging were as follows:

(a) Social and psychological changes are not so obvious between the ages of 22 and 44, but they cover years of social and emotional growth.
(b) The involutional period usually occurs between 45 and 54.
(c) Gross endocrinological changes often occur between 45 and 54 in men and women.
(d) The middle fifties are the years when senium disorders make their appearance clinically.
(e) The prevalence of neurotic disorders for males and females between 45 and 54 was slightly higher for males than for females.
(f) After 55 years of age, prevalence of psychoses is considerably lower than the rate for the 25-34 age group for which it is the highest.

35. Cameron, N., "Acute and Chronic Brain Disorders," in Cameron, N., Personality Development and Psychopathology, Boston: Haughton, Mifflin Company, 1963, pp. 738-742.

The purpose was to delineate the various manifestations of psychopathology as related to old age.

Cameron has offered a discussion that is contigent upon the works by Rothschild, Birren, Sands and Lewis. Of the senile psychotic conditions mentioned are: psychosomatic disorders, guilt as a source of anxiety and obsessive compulsive reactions.

The following grouping of senile psychoses was made:

(a) The psychotic reaction is an understandable outgrowth of long-standing personality difficulties -- the process of aging reduces the person's resources until he can no longer maintain adequate equilibrium.

(b) Special stress of a somatic or situational character precipitate a psychosis in persons with seemingly well integrated personalities -- in the case of the aged, such stress might result from death of the spouse, lack of employment, etc.
(c) A group in which neither personality nor dramtic events seem responsible -- the largest of the three groups, this is a picture of simple deterioration and sometimes complete surrender in the face of appalling isolation and meaninglessness of an aged life.

One must also consider that the aged person must react to his decreasing adequacy, security and prestige; in the final analysis, in all aged persons the most important single consideration is to keep the individual in active contact with others and to keep him working at his optimal capacity, which is usually considerably higher than his lowered initiative and self-esteem indicate.

36. Aaronson, Bernard, "Personality Stereotypes of Aging," The Journal of Gerontology, 1966, 21: 458-462.

This study attempted to identify from the responses elicited from a sample of young adults, some existing stereotypes of personality changes that occur with aging. The Gough Adjective Rating Scale (GARS) was employed and Ss were asked to check those adjectives which, in their opinion, described the typical person at decade intervals from 5-85. The results supported the hypothesis that there are certain identifiable stereotypes of the way people are at various ages. These stereotypes seem to subdivide into three groups which recall the traditional divisions of the life span into childhood, adulthood and senescence; childhood being the first two decades and senescence the last three. Energetic outgoingness was associated with childhood, socialized control with adulthood and anergic constriction with loss of energy and constriction peaking in the ninth decade. Mature restraint was associated with adulthood, youthful exuberance with childhood and asocial inefficiency with childhood and senescent periods.

37. Butler, R.N., "The Life Review: An Interpretation of Reminiscence in the Aged," Psychiatry, 1963, Vol. 26. 65-76.

This paper postulates the universal occurence in older people of an inner experience or mental process of reviewing one's life. This process helps account for the increased reminiscence in the aged. It contributes to the occurence of certain late life disorders, particularly depression. This process also participates in the evolution of such characteristics as candor, serenity and wisdom among certain of the aged.

Life review is not a passive process; it is a constructive effort to achieve an active, purposeful form of reminiscence. The reminiscence of older persons are not only to recall facts, but also to weave them into an acceptable perspective. The realization of one's vulnerability

or approaching death can be accompanied by the progressive return to consciousness of details of events and unsolved conflicts from the past.

C. LEARNING, THINKING AND INTELLIGENCE

38. Jones, H. E., Conrad, H.S., "The Growth and Decline of Intelligence: A Study of a Homogeneous Group Between the Ages of Ten and Sixty," Genetic Psychology Monographs, 1933, Vol. 13, pp. 223-298.

This study was concerned with the growth and decline of intelligence in rural New England, as indicated by 1191 administrations of the Army Alpha intelligence test, Forms 5 and 7.

A sample of 1191 subjects, aging from 10 to 60, from 19 villages in rural Massachusetts, Vermont and New Hampshire took group administered Army Alpha intelligence tests. The statistical techniques included computing means, medians and standard deviations for raw scores. T-score equivalents of these statistical constants were derived by the method of direct conversion. The Growth Curves were based on the arithemetic average of the smoothed mean; the smoothed median and the smoothed values of each age being taken from the smoothed growth curves.

The developmental curve for the total Alpha test revealed a linear growth to about 16 years, with negative acceleration beyond 16 to a peak between the ages of 18 and 22. A decline follows which is more gradual than the curve of growth, but which by the age of 55 involves a recession to the 14 year level. The developmental curve for the individual subtest reveal that adolescents are superior in some tests, adults in others; the peak of development in some tests is about 18 years and, in others, it is much later; in some tests decline beyond the maximum is fairly precipitious, in others practically negligible. Tests of information revealed no post-adolescent decline. Tests involving analogies, common sense and numerical commercial completion reveal a most rapid decline. The scores of subjects from remote districts are consistently lower than the scores of those from less rural areas except for the scores of general information and analogies. There is a differential rate of growth in adolescence; the absence of such differential development is noted in maturity. Forty percent of the total Alpha score of those in their 60's came from tests of information; at 10 years, these tests account for only twenty-five percent. Within the age range of these subjects, individual differences among those of the same age outweigh the differences between ages.

39. Lorge, I., "The Influences of the Test Upon the Nature of Mental Decline as a Function of Age," Journal of Educational Psychology, 1936, Vol. 27, pp. 100-110.

The purpose of this study was to determine the relationship between age and various tests of mental ability. The assumption was that the

relationship of age, as measured by chronological age, and ability as measured by both the power to complete a range of difficult tasks successfully and to so complete them within a given time limit, depends upon the ability being measured and the test used to measure it.

One hundred and forty-three adults aged 20 to 70 years, were given the IER Intelligence Scale CAVD with unlimited time allowance and five other mental ability tests; 80 of these adults also took another five such tests. The means and standard deviations for each of the tests taken and for age are presented as are the coefficients of correlation between age and the various tests of intelligence. In both cases the scores are given for the two sub-groups and for the total population. Attention is also given to the degree to which age negatively affects a measurement of ability and to the rate of decline of mental ability. The former is estimated from the size of the correlation coefficients; the latter by use of the regression equation of each of the tests of mental ability.

Findings: There is a very noticeable difference in the relationship of age to the IER Intelligence Scale CAVD and of age to the other tests. This is seen to support the fact that the CAVD is a measure of power and the other tests a measure of both power and speed. The relationship between age and ability varies according to the test used to measure ability.

40. Sorenson, H., "Adult Ages as a Factor in Learning," Journal of Educational Psychology, September 1930, Vol. 21, pp. 451-459.

The purpose of this study is to examine the idea that the decreased learning ability of the older adult is due in part to disuse resulting from an absence from systematic study.

The subjects were three extra-mural classes of elementary public school teachers, 20 to 56 years, who were studying for a Bachelor of Education degree. One class included many teachers returning to serious study after a long absence; the other two groups consisted of teachers recently involved in university courses. Three sets of data were collected: intelligence scores from the Miller Analogies Test; the amount of study per teacher by a weekly report; achievement measurements by an extensive object test. The partial-correlations technique was used to obtain the evidence of the effect of age on learning.

The evidence tends to support the theory that disuse explains the evident disability to learn with increasing age. There was no age disadvantage for the groups enrolled recently in other courses; older and younger teachers achieved about equally. The group which had been away from course work for a long time was at a disadvantage. For these people, achievement declined significantly with age. Mental processes involving the kind of acquisition, association and retention of facts and symbols related to course work decline with disuse. For elementary school teachers, mental ability sustains itself up to fifty years of age if it is

involved in heavy course work for credit.

41. Owens, W.A., "Age and Mental Abilities: A Longitudinal Study," Genetic Psychology Monographs, August 1953, Vol. 48, pp. 3-54.

The main problem was to discover the consequences of a 30-year age increment upon the mental performances measured by certain scores of Army Alpha, Form 6. The other problems considered were (1) the effects of this age increment upon the extent of individual differences and trait differences as measured (2) the relationship of certain personal social variables, measured on a "Personal Information Sheet," to the noted temporal shifts in the subtest and total Alpha score.

During 1949-1950, 127 males, 65% of a group which in 1919 had taken Army Alpha (Form 6) as an extrance exam to Iowa State College, were retested. Both sets of raw scores on each of the eight subtests, and on the total, are given as coded standard scores obtained from normally distributal norm distributions for 1000 cases. A 20 item "Personal Information Sheet," covering many of the conjectured personal-social correlates of age changes, was also completed by each subject.

With regard to the main problem of the effect of a 30 year age increment upon subtest and total test scores, there were significant increases in the score of 4 subtests (Practical-Judgment, Synonym-Antonym, Disarranged Sentences and Information) and in the total Alpha score. There was no significant decrease in score on any subtest. While trait differences remained remarkedly constant, there were significant increases in the magnitude of individual differences as measured by the Analogies subtest and by the total Alpha score. With respect to the personal-social correlates of the observed temporal shifts in test scores (1) the younger subjects tended to make the highest total Difference scores (2) on the Analogies subtest, and on the total score, subjects with over 5 years of college had significantly higher mean D-scores than those with less than 4 years of college. The various subtests revealed significant variations among the mean D-scores of those subjects who had specialized in agriculture, engineering and other professions. Different subtests revealed a significantly higher mean D-score for those subjects who had come to college from rural areas, for those who had migrated from rural areas (pre-college) to urban areas (post-college) and for those who had a number of hobbies and/or recreational activities when compared respectively with those coming to college from urban areas, with those not migrating from rural areas (pre-college) to urban areas (post-college) and with those who have 0 or 1 hobby.

42. Bayley, N., Oden, M., "The Maintenance of Intellectual Ability in Gifted Adults, " Journal of Gerontology, January 1955, Vol. 10, pp. 91-107.

The purpose of this study was to compare test and retest scores earned about 12 years apart by a group of intellectually superior adults on a

very superior test.

Seven hundred and sixty-eight of the twice-tested subjects were tested as children in the 1921-1922 Stanford Study of Gifted Children. Three hundred and thirty-five were spouses of subjects in the Terman study of 1939-40 and 1950-52. Test comparisons include the scores of both the original gifted group and their spouses; others are limited to those of the gifted group alone. The 1939-40 Test Form A was called Concept Mastery and had two subtests: I Synonyms and Antonyms; II Analogies. The 1950-52 Test Form B was an alternate form of Concept Mastery. For purposes of control, the Concept Mastery scores were compared in the light of the age at testing, of amount of education, of general adjustment and mental health and of occupation.

There was a highly significant increase in the retest scores by all subjects. There appears to be a ceiling which diminishes the general tendency for greater increase in test scores to occur in the more highly intelligent person. Gains occurred in all occupational and educational levels, at all ages 20 to 50 and at all levels of ability except where the ceiling prevented it. There were gains in both subtests, the greater gain being in the synonym-antonym subtest. There was less variability of scores for the gifted group; this variability decreased at second testing and with increasing age. A second testing, occupational, educational, mental health and class differences were less. Variability of spouses' scores was greater and increased on retest.

The relation between occupations and scores of the men declined, of women increased. (Housewives did less well, "other professions," exclusive of below college level teachers, did much better.) For the men, engineers had the lowest scores in the first test; teachers of below college level scored the lowest in the second. Educational level achieved correlated positively with scores. Gains were greater for those with less education, possibly because of a low ceiling on tests. There was a tendency for the more seriously maladjusted to earn higher scores. Health was not related to scores. All age groups showed significant similar tendencies to increase scores over the 12-year interval. This increase was slightly smaller for the older group (40's) and more evident for Analogies than for Synonym-Antonym subtest. Lower scores of the younger subjects was felt to be a function of their age (20's). The highest scoring groups showed the greatest gains.

43. Bradway, K.P. and Thompson, C.W., "Intelligence at Adulthood: A 25 Year Follow-Up," Journal of Educational Psychology, 1962, Vol. 53, pp. 1-14.

One hundred and eleven subjects of the Terman group, tested with Stanford-Binet at preschool and adolescent level, were administered the Stanford-Binet and WAIS 25 years later (27-32 age range).

IQ scores were relatively stable. Intellectual growth potential continues to increase after 16, but at a slower rate. Males showed sig-

nificantly more IQ gain from adolescence to adulthood than did females -- high IQ girls gained less than high and low IQ boys and low IQ girls. The higher the adolescent IQ score, the lower the rate of increase. Gain in IQ not related to continued education. Growth after adolescence was greater in abstract reasoning and vocabulary than in rote memory and practical reasoning. Verbal and memory scores were better able to predict both verbal and performance aptitudes of adults than were non-verbal scores. Number concept items were not reliable predictors of later aptitude.

44. Owens, William A., Jr., "Is Age Kinder to the Initially More Able?" Journal of Gerontology, 1959, Vol. 14, pp. 334-337.

Owens tested the 1919 Army Alpha group a third time and compared shifts in the lower and upper groups, 17 in each.

There were no differentially higher gains at initially higher ability levels -- increments and decrements occurred in all subjects. Individual differences tended to persist and to increase slightly but significantly. Gains were greatest in Verbal, Information, Synonym-Antonym, Disarranged Sentences; losses greatest on Analogies. Improved scores correlated with number of hobbies. He concluded that the gifted were not spared by aging.

45. Glanzer, M., Glaser, R., "Cross-Sectional and Longitudinal Results in a Study of Age-Related Changes," Educational and Psychological Measurement, 1959, Vol. 19, pp. 89-101.

The twofold purpose was (1) to develop a group of tests to measure the effect of aging upon skilled performance (2) to compare the data obtained by cross-sectional and longitudinal administrations of the tests.

A battery of tests were administered to a sample of 454 aircrew officers of the Air National Guard and 90 commercial airline pilots whose ages ranged from 20-50. The tests measured behavior that differentiated between successful and unsuccessful aircrew officer performance and were somewhat sensitive to aging effects on critical job element areas. The functions involved in the tests were (1) understanding verbal material (2) learning and remembering (3) making numerical computations and approximations (4) using mathematical reasoning (5) showing ingenuity (6) changing orientation (7) identifying marginally visible objects (8) interpreting data from instruments (9) interpreting spatial patterns. All subjects did not take all tests. The cross-sectional relationship of each of the tests to chronological age was evaluated by means of correlation coefficients between test scores and age at time of testing. Longitudinal data was gained when scores from four tests given 10 to 12 years previously were obtained and differences between the first and second test scores for each subject were compared.

The cross-sectional data revealed that eight of the four tests showed significant decreases, though of small magnitude, with age. Areas

evidencing loss were (1), (2), (5), (6), (8), and (9). The longitudinal data showed a significant increase in test scores, an opposite trend to that apparent in the cross-sectional data. The explanation for this is the learning and aging effect.

46. Bromley, D. B., "Some Experimental Tests of the Effect of Age on Creative Intellectual Output," Journal of Gerontology, January 1956, Vol. 11, pp. 74-82.

The purpose of the study was to discover whether performance on the Shaw Test, a test of creative intellectual output, varied with age in the same way as actual achievement varies with age as described by Lehman in Age and Achievement. If it does, then the Shaw Test can be taker as a valid measure of creative intellectual ability. On Lehman's findings it was implicitly hypothesized that (A) the effects of age on the Shaw Test performance would be (1) a slow decline of quantity of output (2) a faster decline of quality and quantity of output (3) the occurring of the peak years of quality and quantity in the youngest age group (4) a faster decline of very high quality output than output of lesser quality and that (B) there would be (1) a positive and significant association between quality and quantity (2) no sex differences in relation to any association between age and creative intellectual output (3) no association of decline with age of quantity and quality of output with the decline with age of general intelligence.

A total of 265 subjects were put into comparable groups of four age levels 17-35, 35-51, 51-66, 66-82. Apart from those over 66 years of age, the subjects were of average to superior intelligence and social background. The Shaw Test was administered and the quality and quantity of each subject's performance was measured. The totals, means and standard deviations of scores of the various classes of Shaw Test responses for each age group were determined and descriptions of the subjects in terms of age, sex, social background and Wechsler-Bellevue I.Q. were compiled.

The results fairly well supported the expectations based on Lehman's analysis. (A) It is in the youngest age group that peak years for quantity and quality occur; with age comes a decline of both quality and quantity, with quality declining more rapidly; output of very high quality declines faster than output of lesser merit. (B) The original thinker is more productive of ideas in general, however only if the ideas are above a certain minimum level of quality. Holding general intelligence constant, there appears to be no sex differences in connection with any association between age and creative output, although to do so is to reduce the apparent association between age and quantity and age and quality. Loss of intellectual efficiency with age accounts for a major part, though not all, of the decline of quantity and quality of creative output. This is contrary to Lehman's argument which places more stress on changes in physical factors.

47. Kay, H., "Learning of a Serial Task by Different Age Groups," Quarterly Journal of Experimental Psychology, Part 4, 1951, Vol. 3, pp. 166-183.

The two aims of the study were (1) to investigate the influence of age on the learning of a simple serial task (2) to see if an examination of the influence of the age variable in this case clarified some of the problems in learning studies.

Fifty subjects, 10 belonging to each decade from 20 to 70, were matched by age groups for occupation and social background. The apparatus used consisted of 10 morse keys above which were 10 lights, one for each key. The serial task was composed of two sets of correct light sequences. The design of the experiment called for three stages (1) learning series I and II (2) relearning of series (3) alternation of learned series. The criteria by which the execution of the task was considered included the number of trials, the number of errors, time taken and the kind of learning mistakes: a spatial expectancy error or anticipatory error.

Each age group showed a decline in performance. There was a loss of speed in the 30's, a loss of accuracy in the 40's and a notable loss of both in the 50's and 70's. Stages I and II revealed that older subjects were forgetting more quickly than the younger and that the incapability to produce new responses in an already mentally formed sequence was their major difficulty. To the extent that the subjects learned their repeated errors, final learning involved unlearning, with observable cue of the previously learned error serving as cue for the more recently learned correct response.

48. Chown, S.M., "Age and the Rigidities," Journal of Gerontology, October 1961, Vol. 16, pp. 353-362.

The purpose of the study was to examine the relationship between rigidity and age by seeking to discover (1) the structure of the rigidities being measured (2) the relationships of the various rigidities to age (3) if, for the older subjects, any rearrangement of the rigidity factors took place. It was expected that Spontaneous Flexibility, Adaptive Flexibility, Disposition Rigidity, Personality Rigidity and Speed would remain distinct except for the possibility of the first two being less distinct in the case of older subjects.

Two hundred subjects, aged 20 to 82, were given 16 tests of rigidity and two intelligence tests. The non-original tests were group administered. Those subjects from the over 60's clubs took their tests in two sessions a week apart while the others completed theirs in one session. Rigidity was defined as lack of change of behavior, where a change is necessary for success at the task, and where the subject knows that a change is likely to be demanded. Hotelling's principle components method of analysis was applied to the test results of the group as a whole and to those of three age groups drawn from the main sample. The mean ages of the three groups were 26.4, 40.7, and 60.7.

Five distinct components of rigidity were found: Spontaneous Flexibility, Alphabet Rigidity, Disposition Rigidity, Personality Rigidity and Speed. No individual differences associated with either age or intelligence were found to exist for these distinct components. Age and general intelligence were closely related. Three tests measuring Adaptive Flexibility, part of one measuring Disposition Rigidity and one measuring Personality Rigidity revealed an age relationship as distinct from an intelligence relationship. The effects of a low intelligence score were far more important than age itself. Twenty percent of the thirty-one percent variance of the age and intelligence factors combined was accounted for by the Intelligence Factor. The analysis of the three different age groups revealed similar rigidity components. The sharpness of the individual factors varied from group to group. With increasing age, the effect of speed became more diffuse.

49. Clark, J.W., "The Aging Dimension: A Factoral Analysis of Individual Differences with Age on Psychological and Physiological Measurements," Journal of Gerontology, April 1960, Vol. 15, pp. 183-187.

The purpose of the study was to investigate the possible link (1) between the familiar age decline in scores on speeded ability tests and a broader aging dimension with physiological and temperamental components (2) between decline in ability and changes in such physiological measures such as blood pressure.

The 102 subjects included 10 males and 10 females in each age decade from 20 to 70 years. In two sessions the subjects took tests to measure the following variables: spatial ability, reasoning ability, reading preference, aspiration level responsiveness, letter comparison speed, critical aggressiveness, accomplishment/inaccuracy, retrovert/antevert associations, emotional/nonemotional recall, immediate recall, attitude to religion, attitude to old age, systolic blood pressure, hand strength, reaction time, sound threshold, lens accommodation, word-association latency, fear of death, maze error, maze time, socio-economic status, anomie. Product moment correlations were calculated for all variables except those involving the sex variable, for which point-bisexual correlations were computed. Five factors were extracted from the 25x25 correlation matrix by the centroid method and rotated into an approximation to oblique simple structure.

The general aging factor was found to load 19 of the 25 measures thus accounting for almost all the variance of age. This factor could not be broken down. There is a second order ability factor on which all power and speed measures load. It appears to be independent of the dimension which maximizes age and physiological decline, that is it has no age loading. The lack of a pyperplane meant that the positing of the aging factor was inexact.

50. Jarvik, L.F. and Kallmann, F.J. and Falek, A., "Intellectual Changes in Aged Twins," Journal of Gerontology, 1962, Vol. 17, pp. 289-294.

Of the 268 same sex twins over 60 years old who were originally tested, 207 were retested one year later; 78 were tested a third time seven years later; and 17 survived to be tested a fourth time nine years later. Authors used the Wechsler-Bellevue Intelligence-test Scale (1944), List I Vocabulary of the Stanford-Binet (Terman 1916), and a pencil tapping test devised by the researchers.

Scores of one-egg twins were more similar throughout than those of two-egg twins.

The second test, after an interval of one year only, showed almost uniform increases in all scores, revealing the stability of the functions tested, plus a possible "test wiseness."

Fourty-eight twins completed all seven tests a third time (including Digits Forward, Digits Backward, Digit Symbol Substitution, Block Designs, and Similarities of the Wechsler). Significant decline in Tapping and Digit Symbol Substitution scores. Decline in Block Designs also, but not significant statistically. Essentially there was no change on other five tests when compared to the first test administered. However, when compared to the second test given, there was a decrease in the mean scores in all tests except Digits Forward. Results suggested possible relationship between test scores and survival (see references below).

Strongest genetic components found for Vocabulary, Digit Symbols Substitution, Block Designs, and Tapping.

51. Eisdorfer, C., "The WAIS Performance of the Aged: A Retest Evaluation," Journal of Gerontology, 1963, Vol. 18, pp. 169-172.

In this study, 165 subjects, divided into two groups at the time of the first testing, one group 60-69 years old, the other group 70 years and over, were given the WAIS once, and then again three years later.

There was some indication that those with the higher scores tended to survive longer. There was little overall decline in those retested. The minor changes that occurred were in the direction of a regression towards the mean.

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